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ABSTRACT

The Daviess County, Kentucky, PREPS research project focused on evaluating the county's 1979 summer school program. This program invited children to attend if they were functioning at least one year below their grade placement level. Learning activities were structured around specific behavioral objectives; the emphasis was on reading and mathematics. The evaluation of the program consisted of analyzing whether reading and mathematic achievement were significantly related to attendance in summer school, and whether this relationship was equally true for boys as well as for girls. When all summer students were contrasted against non-summer school students, significant differences were found only at the grade 2 level in reading; in addition, summer school was helpful for grade 2 girls in mathematics. (Author/GK)

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DOES ATTENDANCE IN SUMMER SCHOOL INCREASE READING AND MATH ACHIEVEMENT OF ELEMENTARY STUDENTS?

PREPS RESEARCH PROJECT

1979 - 1980

THE DAVIESS COUNTY SCHOOL SYSTEM
OWENSBORO, KENTUCKY

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0.1 INTRODUCTION

The Daviess County PREPS research project focused on evaluating the Daviess County 1979 summer school program. The summer school consisted of 20 half-day sessions held during the months of June and July. Children were invited to attend summer school if they were functioning at least one year below their grade placement level. The learning activities of the summer school were structured around specific behavioral objectives written prior to the program. The atmosphere of the program was informal. The program included a great deal of small group work and allowed time out for a mid-morning snack. The emphasis of the program was on reading and mathematics.

The evaluation of the summer school program consisted of analyzing whether reading and mathematic achievement were significantly related to attendance in summer school and whether this relationship held true for boys as well as for girls.

0.2 RESEARCH HYPOTHESES

0.2.1 First Hypothesis

First grade Daviess County students enrolled in summer school (1979) will score significantly higher on their adjusted CTBS posttest scores in total reading and total mathematics when compared to Daviess County students eligible but not attending summer school.

0.2.2. Second Hypothesis

Second grade Daviess County students enrolled in summer school (1979) will score significantly higher on their adjusted CTBS posttest scores in total reading and total mathematics when compared to Daviess County students eligible but not attending summer school.

0.2.3 Third Hypothesis

Third through seventh grade Daviess County students enrolled in summer school (1979) will score significantly higher on their adjusted CTBS posttest scores in three measures of reading and four measures of mathematics when compared to Daviess County students eligible but not attending summer school.

0.2.4 Fourth Hypothesis

First grade Daviess County students enrolled in summer school (1979) will score significantly higher on their combined adjusted CTBS posttest scores in total reading and total mathematics when compared to Daviess County students eligible but not attending summer school.

0.2.5 Fifth Hypothesis

Second grade Daviess County students enrolled in summer school (1979) will score significantly higher on their combined adjusted CTBS posttest scores in total reading and total mathematics when compared to Daviess County students eligible but not attending summer school.

0.2.6 Sixth Hypothesis

Third through seventh grade Daviess County students enrolled in summer school (1979) will score significantly higher on their combined adjusted CTBS posttest scores in total reading and total mathematics when compared to Daviess County students eligible but not attending summer school.

The above hypotheses will also be tested using only male data and again using only female data.

0.3 INSTRUMENTATION

The 1972-73 nationally normed Comprehensive Test of Basic Skills (CTBS) published by McGraw-Hill (1976) was used to collect academic achievement in reading and mathematics. Form S was administered in the spring of 1979. Form T was administered in November 1979. Five levels of the test were administered following the recommendations of the publisher. The levels were:

Test Level	Grade Level of Student
A	1
B	2
1	3 and 4
2	5 and 6
3	7

Levels A and B measured different reading and math skills than levels 1 through 3. Consequently, data were analyzed separately for grades one and two. Data for grades three through seven were pooled after converting scores to normal curse equivalent (NCE) scaling. To maintain consistency, data for grades one and two were also converted to NCE scaling.

The spring administration of the CTBS was scored by the Kentucky State Department of Education. The November administration of the CTBS was hand scored.

0.4 POPULATION AND SAMPLING

The population of the study consisted of Daviess County students in the first through seventh grades during the 1978-79 school year who were invited to attend the summer school program (n=approximately 900). Students were invited to attend summer school if they scored in the lower three stanines in reading and/or mathematics on the spring 1979 administration of the CTBS or if in their teachers' judgment they were functioning a

year behind their classmates. The sample of summer school students used in this study consisted of those students who attended summer school at least 14 of the 20 days the program was in operation and on whom both spring and November CTBS scores were available (n=255). The control group was a randomly selected sample of students who had been invited to attend the program but who did not attend (n=228).

0.5 DATA COLLECTION PROCEDURES

Spring data was taken from student records which had been collected as part of the annual school-wide testing program. A special administration of the CTBS was given to identified students in November of 1979.

0.6 ASSUMPTIONS AND LIMITATIONS

This study contrasted reading and mathematics CTBS achievement scores of students who attended summer school and students who were invited but did not attend summer school. The study assumed that those students who self-selected summer school were no different from students who did not attend summer school. Comparison of the samples using pretest data showed no significant differences on any pretest measures of reading and mathematics.

0.7 FINDINGS

Analyses to evaluate the effectiveness of summer school were planned around measuring the increase in reading and mathematics achievement from spring 1979 until November of 1979. This strategy was chosen because the Daviess County administration was concerned with determining whether long-term gains were being made as a result of participation in summer school.

Analyses are reported in three grade level divisions: (1) first grade, (2) second grade, and (3) the combination of grades three through seven. Separate analyses by grade level divisions were calculated because reading and total mathematics appear to measure somewhat different concepts in these early years. Analyses reported for grades three through seven were also analyzed for each grade level (not reported in this document). No substantial differences were found across any grade level. Analyses are reported on seven subscales of reading and math for third through seventh grade levels and on the total reading and total math for first and second levels.

Pooling the data from grades three through seven necessitated a conversion of the scale scores to a common metric: the normal curve equivalent (NCE) unit.

The NCE unit is a relatively new scale of measurement that has the following properties: (1) it is an equal interval scale, (2) it ranges from 1 to 99, (3) it has a mean of 50, and (4) it has a standard deviation of 21.06 (Fagan and Horst, 1976).

In order to determine learning gain sensitively from the time of the pretest to the time of the posttest residualized gain scores were calculated (Kerlinger, 1973). This procedure calls for predicting posttest scores from pretest scores through a regression equation and then subtracting the predicted score from the actual posttest score to purse posttest scores from pretest influence. The resulting adjusted scores measure learning unaffected by original knowledge in the subject area.

Statistical significance for the study was set at the 0.05 level.

Findings will be reported in three sections. First, data will be presented for all students. Second, data will be presented for boys. Third, data will be presented for girls.

0.7.1 All Students

Table 1 gives the means, standard deviations, and sample size (n) for NCE residualized scores for summer school students and for non-summer school students for all three grade divisions.

Table 2 gives the univariate and multivariate tests of significance for these same measures. Univariate F-tests were calculated on each measure. Multivariate F-tests were calculated combining total reading and total mathematics. The only significant F-test combining data for boys and girls was in total reading at the second grade level where summer school students scored six NCE residualized points higher than non-summer school students.

A three point NCE residualized difference between the two groups was chosen as meaningful. One contrast met this criterion: summer school students scored at least three NCE residualized points above non-summer school students in total math at the first grade level.

0.7.2 Boys Only

Tables 3 and 4 duplicate the analyses of Tables 1 and 2 using data for boys only. No univariate or multivariate analyses were significant on male data.

Meaningful differences (greater than three NCE residualized points and less than significant differences) were as follows: (1) summer school boys scored at least three NCE residualized points higher than non-summer school boys in total math at the first grade level, (2) summer school boys scored at least three NCE residualized points higher than non-summer school boys in total reading at the second grade level, and (3) non-summer school boys scored at least three NCE residualized points higher than summer school boys in total math at the second grade level.

0.7.3 Girls Only

Tables 5 and 6 duplicate the analyses of Tables 1 and 2 using data for girls only.

Table 1

Mean, Standard Deviation, and n
on Residualized Gain Scores of Summer
School and Non-Summer School Students
on all CTBS Measures by Grade Level Analyzed
-- Combining Both Sexes --

Grade Level and CTBS Area Measured	Summer School Enrollment Status					
	Summer School			Non-Summer School		
	$\bar{x}$	$\bar{\sigma}$	$\bar{n}$	$\bar{x}$	$\bar{\sigma}$	$\bar{n}$
First Grade						
Total Reading	0.60	(8.74)	20	-0.40	(11.07)	30
Total Math	1.89	(14.08)	20	-1.15	(14.44)	33
Second Grade						
Total Reading	2.56	(10.52)	43	-3.67	(11.56)	30
Total Math	1.10	(13.83)	43	-1.58	(17.69)	30
Third Through Seventh Grades						
Vocabulary	0.06	(10.52)	135	0.06	(11.39)	140
Comprehension	0.53	(12.72)	134	0.52	(12.36)	140
Total Reading	-0.74	(10.03)	134	0.71	(10.79)	140
Concepts	-0.83	(14.27)	132	0.76	(13.78)	144
Computation	0.25	(12.92)	133	-0.23	(11.78)	144
Application	-0.91	(14.31)	130	0.82	(11.21)	144
Total Math	0.10	(11.36)	130	-0.09	(9.40)	144

Table 2

F-Ratio and Probability Level
Calculated on Univariate or Multivariate
Analysis of Variance for all CTBS
Measures by Grade Level Analyzed
--Combining Both Sexes --

Grade Level and CTBS Area Measured	F-Ratio and Probability
First Grade	
Total Reading	F=0.12, P=0.73
Total Math	F=0.56, P=0.46
Combined Total Reading and Total Math	F=0.15, P=0.86
Second Grade	
Total Reading	F=5.89, P=0.02*
Total Math	F=0.53, P=0.47
Combined Total Reading and Total Math	F=2.49, P=0.09
Third Through Seventh Grades	
Vocabulary	F=0.01, P=0.93
Comprehension	F=0.01, P=0.94
Total Reading	F=1.32, P=0.25
Concepts	F=0.88, P=0.35
Computation	F=0.11, P=0.74
Application	F=1.26, P=0.26
Total Math	F=0.03, P=0.88
Combination of Total Reading and Total Math	F=1.32, P=0.27

*Significant at or beyond the 0.05 level of significance

Table 3

Mean, Standard Deviation, and n
on Residualized Gain Scores of Summer
School and Non-Summer School Students
on all CTBS Measures by Grade Level Analyzed
-- Boys Only --

Grade Level and CTBS Area Measured	Summer School Enrollment Status					
	Summer School			Non-Summer School		
	$\bar{x}$	σ	n	$\bar{x}$	σ	n
First Grade						
Total Reading	-2.21	(9.84)	10	-1.29	(11.93)	17
Total Math	2.79	(12.92)	10	-2.77	(14.51)	19
Second Grade						
Total Reading	1.75	(11.33)	28	-4.20	(13.56)	18
Total Math	-2.17	(14.36)	28	1.80	(11.33)	18
Third Through Seventh Grades						
Vocabulary	0.61	(11.34)	85	-1.45	(9.73)	71
Comprehension	-3.23	(13.52)	84	-1.73	(14.39)	71
Total Reading	-2.43	(9.52)	84	0.12	(12.98)	71
Concepts	-0.82	(15.61)	84	-1.01	(14.81)	74
Computation	-0.57	(12.65)	85	-2.82	(11.64)	74
Application	-1.84	(14.10)	84	-1.49	(11.84)	74
Total Math	-0.51	(10.34)	84	-2.19	(10.19)	74

Table 4

F-Ratio and Probability Level Calculated on Univariate and Multivariate Analysis of Variance on All CTBS Measures by Grade Analyzed
-- Boys Only --

Grade Level and CTBS Area Measured	F-Ratio and Probability
First Grade	
Total Reading	F=0.02, P=0.90
Total Math	F=0.46, P=0.50
Combined Total Reading and Total Math	F=0.12, P=0.89
Second Grade	
Total Reading	F=2.19, P=0.15
Total Math	F=0.95, P=0.33
Combined Total Reading and Total Math	F=2.20, P=0.12
Third Through Seventh Grades	
Vocabulary	F=1.43, P=0.23
Comprehension	F=1.27, P=0.26
Total Reading	F=2.15, P=0.15
Concepts	F=0.02, P=0.88
Computation	F=1.26, P=0.26
Application	F=0.05, P=0.82
Total Math	F=1.05, P=0.31
Combination of Total Reading and Total Math	F=2.14, P=0.12

*Significant at or beyond the 0.05 level of significance

Table 5

Mean, Standard Deviation, and n
on Residualized Gain Scores of Summer
School and Non-Summer School Students
on All CTBS Measures by Grade Level Analyzed
--Girls Only --

Grade Level and CTBS Area Measured	Summer School Enrollment Status					
	Summer School			Non-Summer School		
	$\bar{x}$	σ	n	$\bar{x}$	σ	n
First Grade						
Total Reading	3.41	(6.84)	10	0.7[illegible]	(10.19)	13
Total Math	0.99	(15.80)	10	1.06	(14.58)	14
Second Grade						
Total Reading	4.08	(8.96)	15	-2.88	(8.18)	12
Total Math	7.22	(7.22)	15	-6.66	(23.63)	12
Third Through Seventh Grades						
Vocabulary	-0.87	(8.98)	50	1.37	(12.79)	69
Comprehension	3.98	(9.80)	50	2.83	(9.39)	69
Total Reading	2.10	(10.33)	50	1.32	(7.99)	69
Concepts	-0.84	(11.71)	48	2.63	(12.42)	70
Computation	1.71	(13.39)	48	2.51	(11 37)	70
Application	0.80	(14.68)	46	3.26	(10.02)	70
Total Math	1.20	(13.06)	46	2.14	(7.97)	70

Table 6

F-Ratio and Probability Level Calculated on Univariate and Multivariate Analysis of Variance on All CTBS Measures By Grade Analyzed
-- Girls Only --

Grade Level and CTBS Area Measured	F-Ratio and Probability
First Grade	
Total Reading	F=0.19, P=0.67
Total Math	F=0.00, P=0.96
Combined Total Reading and Total Math	F=0.10, P=0.91
Second Grade	
Total Reading	F=4.24, P=0.05*
Total Math	F=5.13, P=0.03*
Combined Total Reading and Total Math	F=4.13, P=0.03*
Third Through Seventh Grades	
Vocabulary	F=1.11, P=0.30
Comprehension	F=0.12, P=0.73
Total Reading	F=0.15, P=0.70
Concepts	F=1.98, P=0.16
Computation	F=0.35, P=0.56
Application	F=1.12, P=0.29
Total Math	F=0.36, P=0.54
Combination of Total Reading and Total Math	F=0.31, P=0.73

*Significant at or beyond the 0.05 level of significance

All three F-tests (univariate and multivariate) were significant at the 0.05 level for second grade girls. Summer school girls out performed non-summer school girls on all three comparisons. It should be noted that summer school girls out performed non-summer school girls by almost seven NCE residualized points in total reading and by almost fourteen NCE residualized points in total math.

Meaningful differences (greater than three NCE residualized points and less than significant differences) were found for one female comparison: non-summer school girls scored at least three NCE residualized points higher than summer school girls in math concepts at the third through seventh grade levels.

0.8 SUMMARY

Contrasts were made on several CTBS measures between all summer and non-summer school students, between summer and non-summer school boys, and between summer and non-summer school girls at three grade level divisions (first grade, second grade, and third through seventh grade). The purpose of the contrasts was to determine whether summer school students made a significantly greater learning gain than non-summer school students. The CTBS measures used in grades one and two were total reading and total math. The CTBS measures used in grades three through seven were three subscales of reading and four subscales of math.

When all summer students were contrasted against all non-summer school students significant differences were found only at the second grade level in reading. Summer school students out performed non-summer school students in NCE residualized scoring by over seven points.

When all summer school boys were contrasted against all non-summer school boys no significant differences were found.

When summer school girls were contrasted against non-summer school girls significant differences were found on all measures at the second grade level (univariate analysis on the combination of total reading and total math). Summer school girls out performed non-summer school girls in NCE residualized scoring by almost seven points in total reading and almost 14 points in total math.

It would appear that summer school was helpful for second graders and in particular for second grade girls in mathematics.

Reference

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